

WHAT IS CLAIMED IS:

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1. An apparatus for detecting a position of a body on a support surface of a bed, the apparatus comprising:
 - 5 at least one first sensor coupled to the bed, the at least one first sensor having an output signal which is variable in response to changes in a weight applied to the support surface;
 - at least one second sensor located adjacent the support surface, the at least one second sensor having an output signal which is variable in response to changes in the position of the body on the support surface; and
 - 10 a controller having inputs configured to receive the output signals from the first and second first sensors, the controller being configured to monitor the output signals, to provide an indication of changes in the position of the body relative to the support surface, and to provide an indication if the body exits the support surface.
- 15 2. The apparatus of claim 1, wherein the first and second sensors are different types of sensors.
3. The apparatus of claim 1, wherein the at least one second sensor is a resistive pressure sensor.
4. The apparatus of claim 1, wherein the at least one second
- 20 sensor is a capacitance sensor.
5. The apparatus of claim 1, wherein the at least one second sensor is a piezoelectric sensor.
6. The apparatus of claim 1, wherein the at least one first sensor is a load cell.
- 25 7. The apparatus of claim 6, wherein the bed includes a base frame and a weigh frame, the weigh frame being configured to support the support surface of the bed, and wherein the at least one first sensor includes a plurality of load cells configured to couple the weigh frame to the base frame, each of the plurality of load cells being electrically coupled to the controller.
- 30 8. The apparatus of claim 1, wherein a plurality of second sensors are located adjacent the support surface, each of the plurality of second sensors being electrically coupled to the controller.

9. The apparatus of claim 1, wherein the support surface of the bed includes a deck and a mattress located on the deck, the at least one second sensor being coupled to the mattress.

10. The apparatus of claim 9, wherein the at least one second
5 sensor is located within an interior region of the mattress.

11. The apparatus of claim 1, wherein the support surface of the bed includes a deck and a mattress located on the deck, the at least one second sensor being coupled to the deck.

12. The apparatus of claim 11, wherein the deck includes a head
10 deck section, a seat deck section, a thigh deck section, and a leg deck section, and the
second sensors include at least one head sensor coupled to the head deck section, at
least one seat sensor coupled to the seat deck section, and at least one thigh sensor
coupled to the thigh deck section.

13. The apparatus of claim 12, wherein two spaced apart thigh
15 sensors are coupled to the thigh deck section.

14. The apparatus of claim 12, wherein the head sensor is an elongated strip which extends in a direction parallel to a longitudinal axis of the deck, the head sensor being located at a center portion of the head deck section.

15. The apparatus of claim 14, wherein two elongated thigh sensors
20 are coupled to the thigh deck section, the elongated thigh sensors extending in a
direction parallel to the longitudinal axis of the deck.

16. The apparatus of claim 15, wherein the seat sensor is an elongated strip which is configured to extend in a direction transverse to the longitudinal axis of the deck.

25 17. The apparatus of claim 12, wherein the second sensors further
include at least one leg sensor coupled to the leg deck section.

18. The apparatus of claim 12, further comprising an alarm coupled to the controller, the controller having a first mode of operation in which the alarm is activated by the controller only when the at least one first sensor detects that the body has exited the bed, a second mode of operation in which the alarm is activated by the controller when the head, seat and thigh sensors detect that the body has moved away from a central portion of the support surface, and a third mode of operation in which

the alarm is activated by the controller when the head sensor detects that the body has moved away from a central portion of the head deck section.

19. The apparatus of claim 1, further comprising an alarm coupled to the controller, the controller having a first mode of operation in which the alarm is activated by the controller only when the at least one first sensor detects that the body has exited the bed, and a second mode of operation in which the alarm is activated by the controller when the at least one second sensor detects that the body has moved away from a central portion of the support surface.

20. The apparatus of claim 19, wherein the controller includes a third mode of operation in which the alarm is activated by the controller when the at least one second sensor detects that the body has moved away from a central portion of a head section of the deck.

21. The apparatus of claim 20, further comprising first, second, and third mode indicator lights located on the bed which correspond to the first, second, and third modes of operation of the controller, respectively, the controller being coupled to the first, second, and third mode indicator lights.

22. The apparatus of claim 21, wherein the controller is configured to illuminate the first mode indicator light when the controller is in the first operation mode, to illuminate the first and second mode indicator lights when the controller is in the second operation mode, and to illuminate the first, second, and third mode indicator lights when the controller is in the third operation mode.

23. The apparatus of claim 19, further comprising a control panel coupled to the controller to permit a caregiver to select between the first and second modes of operation.

24. The apparatus of claim 23, wherein the control panel is coupled to a siderail of the bed.

25. The apparatus of claim 23, wherein the control panel is located on a pendant coupled to the controller.

26. The apparatus of claim 23, wherein the control panel is coupled to the controller by a remote control transmitter.

27. The apparatus of claim 23, wherein the control panel includes an actuator to permit a caregiver to adjust a volume of the alarm.

28. The apparatus of claim 23, wherein the control panel includes a key button and a separate mode button, the controller permitting the caregiver to change the mode of operation by pressing the mode button only when the key button is also pressed.

5 29. The apparatus of claim 28, wherein the control panel also includes a volume control button, the controller being configured to permit the caregiver to adjust the volume of the alarm using the volume control button only when the key button is also pressed.

10 30. The apparatus of claim 23, further comprising at least two indicator lights coupled to the control panel to provide a visual indication of the mode of operation of the controller.

15 31. The apparatus of claim 1, further comprising an alarm coupled to the controller, the controller being configured to activate the alarm when the patient is out of a predetermined position on the support surface, the controller being configured to detect when the body moves back into the predetermined position on the support surface, and the controller automatically deactivating the alarm upon detection of the body moving back into the predetermined position on the support surface.

20 32. The apparatus of claim 1, wherein the controller is configured to monitor movement of the body on the support surface, the controller being configured to generate an output signal if a predetermined amount of movement of the body is not detected within a predetermined period of time.

25 33. The apparatus of claim 1, wherein the controller includes an output coupled to a communication port to provide a nurse call alarm upon detection of the body moving out of a predetermined position on the support surface of the bed.

34. The apparatus of claim 33, further comprising a nurse call clear actuator coupled to the bed, the nurse call clear actuator being configured to clear the nurse call alarm.

30 35. The apparatus of claim 1, wherein the controller includes an output coupled to a communication network, the controller being configured to transmit a data to a nurse station over the communication network, the data including information related to at least one of a patient weight, a patient position on the support

surface, a bed exit indicator, a mode of operation of a patient position detection apparatus, a brake not set indicator, and a bed not down indicator.

36. The apparatus of claim 1, further comprising an alarm coupled to the controller, and a control panel coupled to the controller, the control panel including an actuator to permit a tone of the alarm to be selected from a plurality of different tones.

37. The apparatus of claim 1, wherein the controller is configured to turn on a room light upon detection of the body moving out of a predetermined position on the support surface.

38. An apparatus for detecting a position of a body on a support surface of a bed, the apparatus comprising:

at least one sensor coupled to the bed, the at least one sensor having an output signal which is variable in response to changes to in the position of the body on the support surface;

an alarm;

a controller having at least one input configured to received the output signal from the at least one sensor and an output coupled to the alarm, the controller having at least two different modes of operation to monitor the position of the body on the support surface and generate an alarm signal to activate the alarm if predetermined conditions are met; and

a control panel coupled to the controller, the control panel including a key button and a separate mode button to permit a caregiver to change the mode of operation of the controller, the controller being configured to permit a caregiver to adjust the mode of operation by pressing the mode button only when the key button is also pressed.

39. The apparatus of claim 38, wherein the control panel is coupled to a siderail of the bed.

40. The apparatus of claim 38, wherein the control panel is located on a pendant coupled to the controller.

41. The apparatus of claim 38, wherein the control panel is coupled to the controller by a remote control transmitter.

42. The apparatus of claim 38, wherein the control panel also includes an alarm volume control button, the controller being configured to permit the

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caregiver to adjust the volume of the alarm using the volume control button only when the key button is also pressed.

43. The apparatus of claim 38, wherein the control panel includes an actuator to permit a tone of the alarm to be selected from a plurality of different
5 tones.

44. The apparatus of claim 38, wherein the controller is configured to turn on a room light wherein the alarm signal is generated.

45. The apparatus of claim 38, wherein the controller has first, second and third different modes of operation, the alarm being activated by the
10 controller when different levels of patient movement on the support surface are detected for the first, second and third modes of operation.

46. The apparatus of claim 45, further comprising first, second, and third mode indicator lights located on the control panel which correspond to the first, second, and third modes of operation of the controller, respectively, the controller
15 being coupled to the first, second, and third mode indicator lights.

47. The apparatus of claim 46, wherein the controller is configured to illuminate the first mode indicator light when the controller is in the first operation mode, to illuminate the first and second mode indicator lights when the controller is in the second operation mode, and to illuminate the first, second, and third mode
20 indicator lights when the controller is in the third operation mode.

48. A bed comprising:
a base;
a support surface coupled to the base;
a controller configured to control an entertainment device including at
25 least one of a television, a radio, a stereo, a video player, and a computer;
an entertainment control panel coupled to the controller, the entertainment control panel including inputs to permit an operator to control operation of the entertainment device; and
a lockout switch coupled to the controller, the lockout switch being
30 configured to disable the entertainment control panel when the lockout switch is actuated.

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49. The bed of claim 48, further comprising an indicator light coupled to the controller, the indicator light being illuminated when the lockout switch is actuated.

50. The apparatus of claim 49, wherein the indicator light is
5 coupled to a siderail of the bed spaced apart from the lockout switch.

52. The apparatus of claim 48, wherein the lockout switch is coupled to a footboard of the bed.

52. The apparatus of claim 51, further comprising a cover coupled to the footboard, the lockout switch being concealed beneath the cover.

10 53. A bed comprising:

a base;

a support surface coupled to the base;

a controller configured to control a plurality of functions including at least one of a night light, a back light, a head articulation actuator, a knee articulation
15 actuator, a hi/lo actuator, and an entertainment device;

a control panel coupled to the controller, the control panel including a plurality of inputs to permit an operator to control the plurality of functions;

a plurality of lockout switches coupled to the controller, the controller being configured to disable operation of selected functions by the control panel upon
20 actuation of corresponding lockout switches; and

an indicator located on the bed spaced apart from the plurality of lockout switches, the indicator being configured to provide an indication when at least one of the lockout switches is actuated to disable operation of at least one of the functions.

25 54. The apparatus of claim 53, wherein the indicator is coupled to a siderail of the bed.

55. The apparatus of claim 54, wherein the plurality of lockout switches are located on a footboard of the bed.

56. The apparatus of claim 53, wherein each of the plurality of
30 lockout switches includes a light located adjacent the lockout switch to indicate when the lockout switch is actuated.

57. An apparatus for aligning a first electrical connector electrically coupled to a control panel located on a removable member of a bed with a second

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electrical connector electrically coupled to a controller on the bed, the apparatus comprising:

- 5 a first connector alignment apparatus having a connector receiving portion configured to secure the first electrical connector to the first connector alignment apparatus;
- a second connector alignment apparatus having a connector receiving portion configured to secure the second electrical connector to the second connector alignment apparatus;
- 10 a first fastener configured to couple the first connector alignment apparatus to the removable member of the bed; and
- a second fastener configured to couple the second connector alignment apparatus to a frame of the bed, one of the first and second connector alignment apparatuses including at least one alignment post, and the other of the first and second connector alignment apparatuses including at least one aperture configured to receive
- 15 the alignment post therein as the removable member is installed on to the frame of the bed to align the first and second electrical connectors before the first and second connectors are mated.

58. The apparatus of claim 57, wherein the frame of the bed includes at least one post extending away from the frame by a distance greater than a

20 height of the second connector alignment apparatus, and the removable member of the bed is formed to include an aperture configured to receive the post on the frame of the bed to provide an initial alignment between the removable member and the frame as the removable member is installed on to the frame.

59. The apparatus of claim 57, wherein one of the first and second

25 connector alignment apparatuses includes first and second spaced apart alignment posts and the other of the first and second connector alignment apparatuses includes first and second spaced apart apertures configured to receive the first and second alignment posts, respectively, therein.

60. The apparatus of claim 57, wherein the alignment post includes

30 a tapered head portion and the aperture includes a tapered lead-in surface to facilitate insertion of the alignment post into the aperture.

61. The apparatus of claim 57, wherein the first and second electrical connectors are each formed to include a flange, and wherein the connector

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receiving portions of the first and second connector alignment apparatuses each include a central post, at least one spring arm extending away from the central post, and a head configured to engage the flange of the electrical connector to retain the electrical connector within the connector receiving portion.

5 62. The apparatus of claim 61, wherein the head includes a ramp surface configured to engage the electrical connector so that the at least one spring arm is flexed upon insertion of the electrical connector into the connector receiving portion.

10 63. The apparatus of claim 57, wherein the first and second electrical connectors are each formed to include a pair of spaced apart mounting apertures, the connector receiving portions of the first and second connector alignment apparatuses each being formed to include a pair of spaced apart posts configured to receive the mounting apertures of electrical connectors to align the electrical connectors relative to the first and second connector alignment apparatuses.

15 64. The apparatus of claim 57, wherein the first fastener is configured to provide a rigid connection between the first connector alignment apparatus and the removable member and the second fastener is configured provide a loose connection between the second connector alignment apparatus and the frame to permit limited movement of the second connector alignment apparatus relative to the
20 frame.

25 65. The apparatus of claim 64, wherein the frame of the bed is formed to include at least one aperture, and the second electrical connector alignment apparatus includes at least one retention post configured to be inserted into the at least one aperture of the frame, the at least one aperture of the frame being larger than the at least one retention post to permit limited movement of the second connector alignment apparatus relative to the frame of the bed.

30 66. The apparatus of claim 57, wherein the first electrical connector includes at least one alignment post and the second electrical connector includes an aperture configured to receive the alignment post of the first electrical connector therein to provide further alignment between the first and second electrical connectors.

67. The apparatus of claim 57, wherein the first and second connector alignment apparatuses include keys.

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